

ABSTRACT

A semiconductor device ~~[[for use]]~~ in includes a ~~base and emitter shorted by means of a surface electrode. The surface electrode of a vertical-type bipolar transistor and a surge absorption element such as Zener diode, that are formed on the same substrate and connected in parallel. The surge absorption element has a resistance during breakdown operation that is smaller than the resistance of the surge absorption element during breakdown operation of the transistor. In addition, the secondary breakdown current of the surge absorption element is larger than the secondary breakdown current of the transistor. in which a P-type epitaxial growth layer and a P-type semiconductor substrate form the collector is electrically connected to the drain electrode of a lateral MOSFET by means of a metal electrode wiring. Upon application of a high ESD voltage and high surge voltage, the energy of the ESD and surge is absorbed by operation of the vertical-type bipolar transistor surge absorption element and is limited to a voltage equal to or less than the breakdown voltage of the lateral MOSFET that was to transistor, which would otherwise be destroyed.~~